REMARKS

Applicant, his principal representatives in Germany, and the undersigned have carefully reviewed the first Office Action on the merits in the subject U.S. patent application, together with the prior art references cited and relied on by the Examiner in the rejections of the claims. In response, the Substitute Specification and claims of the application, as filed, have been amended. It is believed that the claims now pending in the subject application are patentable over the prior art cited and relied on by the Examiner. Reexamination and reconsideration of the application, and allowance of the claims is respectfully requested.

The subject application discloses, and claims, a cylinder that is adapted to contact a web, typically a web that is being printed in a printing assembly. Such cylinders are used to guide the web and to cooperate with other cylinders to form images, or more specifically image elements on the web. As is well-known in the art, a typical multi-color image that is formed on a web is formed in a multi-step process in which a first cylinder pair imprints a first image element to the web; a second cylinder pair imprints a second image element and further cylinder pairs imprint further image elements to the web. All of these image elements must be in proper alignment or registration with each other to properly form the resultant image. If they are not in proper registration, the result will be an image in which there will be what are typically referred to as registration errors.

As a web is printed in a multi-step printing process, it has liquid ink and often also has a dampening fluid applied to it in each step of the printing process. The application of these liquids to the web, which is usually a porous paper, such as

newsprint, will cause the web to both lengthen in a direction of web travel and to widen or fan out in a direction transverse to the direct of web travel. Conversely, a web that has been dampened and partially printed may shrink longitudinally and/or laterally when it is subjected to an intermediate drying step prior to further printing. Either web stretching or shrinkage contribute to registration problems that can result in the several serially applied image elements not being in proper registration.

It is generally well known in the art that cylinders tend to sag in a direction that is transverse to their axis of rotation and which is also typically perpendicular to the direction of web travel. Such cylinder deflection is caused by the weight of the cylinder itself and by the pressure which is exerted on it by the cylinder that cooperates with it to form a printing couple. Such a cylinder sagging causes a line of contact between the two cylinders to be curved, somewhat in the shape of a smile, when viewed in a side elevation view. In other words, the cylinder ends are apt to be higher than the cylinder middle. The bending of a cylinder in a direction perpendicular to the direction of travel of the web is necessary to provide a uniform contact pressure across the web in a direction that is transverse to the direction of web travel.

The present invention is not directed to a cylinder which is bendable in a direction perpendicular to the direction of web travel. Instead, the present invention is directed to a cylinder which is bendable in the direction of web travel or opposite to the direction of web travel. The cylinder is thus curved to form a smile or frown when viewed from above. The bend or curve of the cylinder results in a curved or arcuate contact line with the cooperating cylinder, again in, or in opposition to the direction of web travel instead of perpendicular to the direction of web travel, as is generally known

in the art.

As discussed above, the web being printed tends to change its longitudinal dimension from one printing couple to the next. By bending the cylinder to a greater or lesser degree, in the direction of web travel, the location in which the second image element is placed on the web, in relation to the first image element, can be varied. This is depicted in Fig. 16. The image elements are depicted schematically as smaller boxes within larger boxes. The location of one of the boxes, with respect to the other one of the boxes can be shifted by bending the counter-pressure cylinder 06 either in the direction of web travel, as depicted at the left, or opposite to the direction of web travel, as depicted in the center, both as seen in Fig. 16. The effects of such shifting of the counter-pressure cylinder are shown schematically in the image elements; i.e. in the superimposed small and large boxes. It is very important to understand that the bending of the cylinder in a direction in, or opposite to the direction of web travel, as disclosed in the subject patent application is very different in purpose and result than the conventional bending of the cylinder in a direction generally perpendicular to the direction of web travel.

In the first Office Action on the merits of October 5, 2006, the drawings were objected to as failing to show the four printing groups recited in claim 35. Claims 34 ane 35 were also objected to as being informal. It was asserted that the independent claim 31 is directed to a cylinder and that those two claims set forth limitations outside of the cylinder.

In response, claims 34 and 35 have been cancelled. The cancellation of these two claims overcomes both the objection to the drawings and the objection to these two

claims.

Claims 31-43, all of the claims pending in the application, were objected to under 35 USC 112, second paragraph as being indefinite. It was asserted that in claim 31 it is not clear how the cylinder bends as a function of at least one image area. It was also asserted that there does not appear to be any structure that supports the limitation.

In response, claim 31 has been amended. It is believed that amended claim 31 complies with 35 USC 112, second paragraph and that it particularly points out, and distinctly claims the subject matter which applicant believes to be the invention. Claim 31 recites a cylinder having spaced first and second cylinder ends and a cylinder body. Such a structure is clearly shown in a number of the drawings and is described in the specification. The cylinder ends and body define a cylinder axis of rotation which extends in a direction that is transverse to a web travel direction. Note Fig. 16 in this regard. The cylinder is supported for rotation in the web travel direction by support means. This may be the bearing bushings 16 depicted in Figs. 5 and 6 or could be other cylinder end supports that are depicted schematically in Figs. 10 and 11. The direction of web travel is also depicted in Fig. 17, which also shows the bending of the cylinder 06 in the direction of web travel.

Claim 31 has further been amended to recite means for shifting the cylinder ends and the cylinder body with respect to each other to impose a bend on the cylinder in the direction of, or in opposition to the direction of web travel. The bearing bushings 16, depicted in Figs. 5, 6 and 7 is one means to accomplish this. The actuating members 27 and 28 depicted in Figs. 10-15 are another means to accomplish this result. This bending is done, as is recited in currently amended claim 31, to shift a location of at

least one image element that is formed on the web which is engagable with the cylinder body. This is shown quite clearly in Fig. 16 and is discussed in the Substitute Specification at paragraph 042 thereof. This discussion continues in paragraph 043.

A control unit is depicted schematically at 47 in Fig. 12. This control unit can be used to control the flow of hydraulic fluid under pressure to the actuating members 27 that are spaced along the cylinder body and which can control the bending of the cylinder. The control unit 47 of Fig. 12 could also be used to control the flow of hydraulic fluid under pressure to tappet or actuating member 19 depicted in Figs. 5-7. Tappet 19 is specifically recited in paragraph 038 of the Substitute Specification, as being hydraulically actuable.

It is believed that claim 31, as currently amended, complies with 35 USC 112, second paragraph. The objection to the claims on that basis is respectfully traversed. All of the other claims now pending in the application depend from claim 31. They thus also are believed to comply with 35 USC 112, second paragraph.

Claims 31, 32, 36-38 and 43 were rejected under 35 USC 102(b) as being anticipated by U.S. patent No. 4,856,155 to Niskanen. Niskanen was recited, in the Office Action, as teaching a means for supporting a cylinder and for imposing a bend on the cylinder in one of a direction in and opposite to the direction of web travel. Claims 33-35 were rejected under 35 USC 103(a) as being unpatentable over Niskanen in view of U.S. patent No. 6,786,151 to Stiel. Claims 39, 40 and 42 were rejected under 35 USC 103(a) as being unpatentable over Niskanen in view of U.S. patent No. 4,438,695 to Maier. Claim 41 was rejected under 35 USC 103(a) as being unpatentable over Niskanen in view of Maier and further in view of U.S. patent No. 4,455,727 to Tschirner.

In the patent to Niskanen, U.S. patent No. 4,856,155 there is shown an adjustable crown roll. As seen in Figs. 1 and 2, a pair of rollers that include a counter-roll 20 and a variable-crown roll 10 define a nip N. The variable crown roll 10 has a stationary central axis 11 which is attached to deflection bearings 12a and 12b. That central axis 11 is provided with a plurality of hydraulic piston-cylinder glide-shot elements.

Referring to Figs. 3a, 3b and 3c, there is shown a side elevation view, in cross-section of the variable-crown roll 10 and of the counter-roll 20. In Fig. 3a the two rolls are in contact. In Fig. 3b the two rolls have been shifted vertically with respect to each other so that there is a spacing distance H between the two. In Fig. 3c, the spacing distance H between the two rolls has been opened by a different amount. It is very important to note that in all three of these figures, and elsewhere in the Niskanen patent that this displacement of one roll with respect to the other is in a direction that is perpendicular to a direction of web travel. The web is depicted at W in Fig. 1. The two lines A-A and C-C which are defined by the arrows and lines in Fig. 1 define the views of Figs. 3a and 3c. It is very clear from these figures that the variable-crown roll 10 and the cooperating counter-roll 20 separate by movement of the crown-roll 10 in a direction which is perpendicular to the direction of web travel.

The central axle 11 of the variable-crown roll 10 is described as a stationary massive central axle. As may be seen in Fig. 1, that axle 11 is somewhat curved in its longitudinal direction. It is also generally rectangular in cross-section, as seen in Figs. 3a-3c. The stationary massive central axle 11 is shiftable through 180° so that it essentially acts as an eccentric whereby the roll mantle 15 that it supports can be

moved forward or away from the counter-roll 20 by the rotation of the massive central axis 11 through 180°, as seen in Figs. 3a-3c.

There is no bending of the cylinder or the variable-crown roll 10 in the Niskanen device. What is asserted as cylinder bending shown in Fig. 1 is, in fact the portion of the somewhat curved, stationary central axle 11 in its position depicted in Fig. 3a. The change in spacing that occurs between the rolls 10 and 20, as depicted in Figs. 3a-3c is a result of the eccentric support of the mantle 15 of the variable-crown roll 10 on the stationary massive central axle 11. This eccentricity, and its use in varying the spacing between the roll mantle 15 and the counter-roll 20 is discussed at the bottom of Column 7, at lines 57-68 of the Niskanen reference.

There is no teaching in Niskanen, nor is there any support in Niskanen for any teaching of the cylinder recited in currently amended claim 31 of the subject patent application. Niskanen discloses a variable-crown roller 10 having an outer mantle 15 supported eccentrically on a central, massive axle 11. That axle 11 is itself permanently curved so that it supports the mantle 15 in a eccentric manner. The result is that the rolls 10 and 20 can be moved toward or away from each other in a direction which is perpendicular to a direction of travel of a web W. Niskanen does not disclose, suggest or teach the structure of the subject invention, as recited in currently amended claim 31. It certainly does not teach or suggest the imposition of a bend on a cylinder in a direction in, and opposite to the web travel direction. Thus, Niskanen does not anticipate claim 31 of the present invention or the various claims that depend from it.

The secondary references cited in combination with the Niskanen patent, to provide various teachings that are absent from Niskanen, do not provide any of the

features of currently amended claim 31 which themselves are not shown, or suggested in Niskanen. The patent to Stiel, No. 6,786,151 is directed to a printer of an offset printing machine that has movable frame modules. These frame modules can be moved with respect to each other and can be used to print multiple images on a web. There is no teaching in Stiel of any type of cylinder bending.

The secondary reference to Maier, No. 4,438,695 is directed to a cylinder that is supported at its ends by bearing frames which can be moved by piston and cylinder assemblies. An outer casing on the cylinder can be given a line of bending that is in harmony with the bending of the other cylinder with which it is used. This is a typical example of a cylinder which can be bent in a direction perpendicular to the direction of web travel. Since the Niskanen patent does not teach or suggest any type of cylinder bending, it is not seen that the Maier reference could be combined with it in any meaningful way.

The third secondary reference to Tschirner, No. 4,455,727 is directed to a friction-driven roll that has a stationary roll core and a supporting tube disposed over the roll core with a jacket tube rotatably supported on the support tube. Elastic bodies are placed between the roll core and the supporting tube. Counter-friction bearings are placed between the support tube and the jacket tube. These various elastic deformable bodies are connectable individually to fluid pressure supply sources and act as fluid pressure cushions. The combination of Niskanen with Maier and Tschirner would not result in a structure that would render obvious the subject invention, as set forth in claim 31 and in the various claims that depend from it.

The additional newly cited prior art was not relied on in the rejections of the

claims. Since it was not applied, no further comment thereon is believed to be required.

During a review of the Substitute Specification, in the course of the preparation of the subject Amendment, several minor typographical errors were noted. These have been corrected in a manner which does not raise any issues of new matter.

Claims 44-63, directed to a non-elected invention, have been cancelled. Applicant again expressly reserves the right to file one or more divisional patent application directed to the subject matter of those claims.

SUMMARY

The Substitute Specification and claims of the subject application have been amended. It is believed that the claims now pending in the application are patentable over the prior art cited and relied on by the Examiner, taken either singly or in combination. Allowance of the claims, and passage of the application to issue is respectfully requested.

Respectfully submitted,

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